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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/543,141	04/27/2006	Tatsuhiko Aizawa	NAII125844	4288

26389 7590 06/11/2009

CHRISTENSEN, O'CONNOR, JOHNSON, KINDNESS, PLLC
1420 FIFTH AVENUE
SUITE 2800
SEATTLE, WA 98101-2347

EXAMINER	
PADGETT, MARIANNE L	

ART UNIT	PAPER NUMBER
1792	

MAIL DATE	DELIVERY MODE
06/11/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/543,141	AIZAWA ET AL.	
	Examiner	Art Unit	
	MARIANNE L. PADGETT	1792	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *7/22/05, 4/27/06 & 4/1/09*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-8 and 21-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8 and 21-25* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *7/22/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

1. Applicant's **election** without traverse of **Group I, method claims 1-8 & 21-25** in the reply filed on 4/1/2009 is acknowledged.

2. **Claim 4** is **objected** to because of the following informalities: in **claim 4**, line 3, "a application" uses the incorrect article for a noun beginning in the vowel "a", thus this grammar error would be corrected by -- an application --.

Also note in **claim 4** that a negative sign "-" should not be separated from the number is modifying, as appears to have been done bridging lines 4-5, where the examiner is assuming that the endpoint of the claimed voltage range is intended to be "-800 V", as there is no other apparent reason for the hyphen to be present.

Appropriate correction is required.

3. **Claims 4-5** are rejected under 35 U.S.C. **112, second** paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In **claim 4**, two options of "a step of applying... voltage" are recited, however in neither case do these claimed treating options say to what the voltage is applied, hence these alternative limitations are vague and indefinite, since as written it is unclear how they are to be done in order to perform the plasma nitriding step.

As noted, **Claim 4** is directed to alternative treating steps for the "plasma nitriding step", however it is uncertain, i.e. **ambiguous**, whether the final limitation in the last line of claim 4 ", **in an activated first nitriding gas atmosphere**" is intended only to apply to the second listed alternative step, e.g. "...continuous D.C. voltage...", as would appear to be indicated by its placement sequential with the second alternative & the punctuation "; or..." separating steps; or if this limitation is supposed to apply to both alternatives, since logic would indicate that whether a single voltage pulse or continuous voltage source is used in the plasma nitriding step, a nitriding gas atmosphere is necessary in either case. Also

with respect to the claimed "activated... atmosphere", it may be considered ambiguous whether the atmosphere employed is already "activated" when the treating step is applied, or if the treating step is causing the atmosphere to be activated, as the phrasing does not make it clear which is intended, with it additionally noted that when not clearly defined by context "activated" may be considered a relative term, that is lacking in clear metes and bounds, as it is uncertain what about the claimed gas is "activated", as it may encompass anything that adds energy or enables any sort of unspecified reaction, in any context, etc., e.g. mildly heated, or ionized,....

In line 3 of **claim 4**, "a application suspending step..." is unclear, as what is being suspended has not been stated, thus has no necessary meaning. However, if applicants intend suspending "applying a pulsed voltage...", this is relatively meaningless, as only one pulse was claimed & for a specified claimed range of times, after which the pulse stops, with no necessary or claimed subsequent pulse(s), for the limitation as written.

While not a clarity problem *per se*, applicants may wish to note that as **presently written** the two alternative treating steps of claim 4 are not necessarily effectively different in effect, since for example, a continuous DC -50 V treatment applied for a length of time of 10 ms (no limit on how long or short the time for applying the continuous voltage, so any length is encompassed), is effectively identical to a 10 ms pulse at -50V in the "pulsed voltage" treating step, as only one pulse is claimed.

In **claim 5**, "**the** first nitriding **gas**" (emphasis added) lacks proper antecedent basis due to inconsistent nomenclature, as the most likely intended previous limitation to which this may refer was "**an** activated first nitriding gas **atmosphere**" (emphasis added), where gas is only an adjective & atmosphere is the noun, thus the limitation of claim 5 cannot be properly said to necessarily refer to the gas atmosphere of claim 4. Also the meaning of claim 5 is confusing, as it is unclear as phrased how applicants intend "a gas" to be read, i.e. generically as a composite of individual gas molecules, or as an individual gas molecule. For the claim as presently written, any gas or mixture of gases containing N &

H, either in the same gas molecule or different gas molecules, etc., will be considered to read on possible meanings of this claim. It is noted that on p. 11, lines 8-22 of applicants' original specification there is provided a mixture of definitions & examples of intended meanings for various gas & nitrogen & hydrogen phrasing, where lines 10-12 might be taking to define the first option in claim 5 as being a single molecule, but then again might not as the only necessary single molecule is an example, not a definition, and the phrase "a gas" is used for all possible meanings throughout this paragraph.

It is **noted** that while the wording of **claims 6 & 22** are not identical, it's not apparent to the examiner how they are intended to differ in scope, as "AlN is produced at a rate..." would appear to be of equivalent scope to "the AlN region is grown at a rate...", although the latter phrase of claim 22 more clearly refers to the effect produced in independent claim 1, while "the plasma nitriding step" reference of claim 6 refers to the action in claim 1, thus apparently claiming the identical limitation with different phrasing.

In **claim 7**, the scope intended by "**chemically activated** second nitriding gas" (emphasis added) is unclear, because with respect to what this "... second nitriding gas" is chemically activated or active has not been specified, thus what it encompasses is not clear. It is noted that while p. 10, lines 1-3 employ this terminology & provide examples of what the "second nitriding gas" might be (e.g. N_2 gas, or a mixture of N_2 gas & Ar gas, etc.), it doesn't define the relative term "chemically activated".

4. The examiner **notes** that "thermal conductivity" is defined as heat flow rate per unit area, where the SI units are Watts/meter Kelvin, which is consistent with the units employed in dependent claim 24, i.e. W/mK.

5. **Claims 1-8 & 21-25** are rejected under 35 U.S.C. **112, first** paragraph, as failing to comply with the **enablement** requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

It is also noted that on p. 8, lines 10-15, a list of "aluminum material having $CuAl_2$" is found that includes: "Al-6Cu, Al-6Cu-0.5Mg, Al-6Cu-2Mg, Al-(0.2-55)Cu-(0.5-1)Ti, Al-(0.2-55)Cu-(0.1-10)Mg-(0.05-1)Ti, and the like". There is further discussion concerning $CuAl_2$ being produced, if an Al-Cu alloy does not contain it, via an "age-precipitation step" that involves undisclosed & undefined low temperatures for unspecified times (item 17 on p. 5 & p. 8-9). Page 9, lines 6-11 note that either the sputter oxide removal step or the plasma nitriding step applied to the aluminum material can cause the precipitation, if unspecified time &/or temperature conditions are used, where the paragraph bridging p. 10-11 (or items 20 & 22, p. 5), appear to be attempting to define the temperatures which when used in the sputtering &/or plasma nitriding steps will produce precipitation of "$CuAl_2$", however all these values are defined in relation to the undefined variable "Tj", which appears to be the temperature in the age precipitation step (4), but the examiner could not find any temperature(s) in the actually disclosed therefore. For these reasons, enablement for causing precipitation of the $CuAl_2$ appears to be deficient, and it is impossible from the specification for the examiner to determine what conditions would have been expected to create the required precipitates

Note that for claim 1, as written, "**the** aluminum material" (emphasis added) in the plasma nitriding step has antecedents in the preparing step, such that at least for the plasma nitriding that results in "an AlN region", the claimed $CuAl_2$ **must** already be present, so enablement for producing the $CuAl_2$ during the last stages of the plasma nitriding is not necessary, as it is excluded from the claims.

6. The following **guidelines** illustrate the preferred layout for the specification of a utility application. These guidelines are suggested for the applicant's use.

Arrangement of the Specification

As provided in 37 CFR 1.77(b), the specification of a utility application should include the following sections in order. Each of the lettered items should appear in upper case, without underlining or bold type, as a section heading. If no text follows the section heading, the phrase "Not Applicable" should follow the section heading:

(a) TITLE OF THE INVENTION.
(b) CROSS-REFERENCE TO RELATED APPLICATIONS.
(c) STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT.
(d) THE NAMES OF THE PARTIES TO A JOINT RESEARCH AGREEMENT.
(e) INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC.
(f) BACKGROUND OF THE INVENTION.
(1) Field of the Invention.
(2) Description of Related Art including information disclosed under 37 CFR 1.97 and 1.98.
(g) BRIEF SUMMARY OF THE INVENTION.
(h) BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S).
(i) DETAILED DESCRIPTION OF THE INVENTION.
(j) CLAIM OR CLAIMS (commencing on a separate sheet).
(k) ABSTRACT OF THE DISCLOSURE (commencing on a separate sheet).
(l) SEQUENCE LISTING (See MPEP § 2424 and 37 CFR 1.821-1.825. A "Sequence Listing" is required on paper if the application discloses a nucleotide or amino acid sequence as defined in 37 CFR 1.821(a) and if the required "Sequence Listing" is not submitted as an electronic document on compact disc).

It is noted that applicants' specification as arranged has no Summary.

7. The following is a quotation of the appropriate paragraphs of **35 U.S.C. 102** that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> **(b)** the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> **(e)** the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

The following is a quotation of **35 U.S.C. 103(a)** which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

8. **Claims 1-3, 6 & 21-23** are rejected under 35 U.S.C. **102(b)** as being anticipated by **Tachikawa et al.** (EP 0158271 A2), considering **Hirano et al**. (6,780,375 B2) & **Yakabe et al.** (2008/0169049 A1) as teaching references.

Claim 8 is rejected under 35 U.S.C. **102(b)** as anticipated by or, in the alternative, under 35 U.S.C. **103(a)** as obvious over **Tachikawa et al.** (EP 0158271 A2), considering **Hirano et al**. (6,780,375 B2) & **Yakabe et al.** (2008/0169049 A1) as teaching references.

Tachikawa et al.((EP): abstract; summary on p. 3-4; p. 5, lines 10-21; p. 6, lines 6-25; p. 7, lines 2-29; p. 8, esp. lines 1-5, 9 & 20-28; p. 9, esp. 10-22 & 27-p. 10, lines 7) teach an ion nitriding process that may be applied to Al or Al alloys (e.g. having at least one of Cr, Cu, Mg, Mn, Si, Ni, Fe, Zn, or the like) in a sealed vessel that has had oxygen removed therefrom. The surface of the Al article is heated to a prescribed nitriding temperature & its surface is activated by cleaning processes that remove organic contaminants and alumina from the surface, where ionize discharge via DC or AC (HF) glow discharge may be employed for the cleaning, i.e. removal, hence reading on the claimed sputtering step. Tachikawa et al. (EP) teach that the activating gases may be one or more of He, Ne, Ar, Kr, Xe & Rn, where the heat treatment & activation step may be combined or separate, with further heat treating performed where necessary. The ion nitriding step is preferably performed in a temperature range of 300-500°C to form an AlN layer with high hardness on the surface; may also use DC or AC glow discharge; and employ a

nitriding gas, such as N_2 or ammonia or mixed gases of N_2 & H_2. Tachikawa et al. note that if the treating temperature for ion nitriding (e.g. plasma nitriding) is less than 300°C the speed of the nitriding is low, but that treating temperatures above 500°C may cause melting and deformation of the article, as well as spalling during cooling of the aluminum nitride layer produced.

While **Tachikawa et al**. (EP) do not discuss their Al alloys containing $CuAl_2$, they provide Exs. 3, 4 & 5 that included test processes employing industrial Al alloys JIS 2017 or JIS 6061, where according to **Hirano et al**. (col. 2, lines 9-15 & table 1, sample #13) **JIS 2017** has mass % 0.52 Si, 0.47 Fe, **4.03 Cu**, 0.55 Mn, **0.16 Mg**, 0.01 Cr, 0.01 Zn, **0.01 Ti**, with the balance Al & teachings that Cu contributes improved mechanical strength by forming $CuAl_2$. Given this teaching of the JIS 2017 alloy composition in employed by Tachikawa et al.(EP) & applicants' p. 8 disclosure of Al alloys having $CuAl_2$, which showed this alloy has compositional percentages as taught by applicant to form $CuAl_2$, the examiner takes notice that JS 2017 would contain $CuAl_2$ as required by independent claim 1. Also, **Yakabe et al**. (table 1, last entry & [0028]) provide compositional teachings with respect to **JIS 6061** having mass % 0.40-0.8 Si, **0.15-0.4 Cu**, **0.8-1.2 Mg**, 0.0 4-0.3 Cr, **<0.15 Ti**, with the balance Al, which also would appear to fit the criteria of applicants' p. 8 alloy listings that have $CuAl_2$ intermetallics, such that Tachikawa et al.'s use of JIS 6061 also would appear to read on preparing the required Al material. Note that Tachikawa et al.(EP) need not specifically mention the presence of $CuAl_2$ precipitates in the alloys used in their process, as they are inherently present in some of alloys employed in their examples.

Tachikawa et al. (EP)'s **Ex. 3** tests both JIS 2017 & JIS 6061, plasma nitriding conditions employing 10 hours to produce a 2.0 μm thick layer (e.g. 0.2 μm/hr) & 6 hours to produce a 1.5 μm layer (e.g. 0.25 μm/hr). **Ex. 5**, in table 5 on p. 19, the process provides the JIS 2017 sample with a 5.0 μm thick AlN layer of hardness (Hv) 2050 & JIS 6061 a 3.2 μm AlN thick layer with a surface hardness (Hv) of 2100. As HV are in units of kilograms-force per square millimeter, they may be converted to pascals by $1kgf/mm^2 = 9.80665 \times 10^6$ Pascal, thus corresponding to approximately 20 GPa & 20.6 GPa, respectively.

As **Tachikawa et al**. do not particularly discussed the claimed $CuAl_2$ intermetallic, there is no discussion of its presence in the resultant AlN surface, however as particularly limiting the plasma nitride processing temperature to avoid melting or deforming the substrate is taught; except for chemical structure changes induced by the ion nitriding, the chemical structure in the surface at the start of the ion nitriding would reasonably have been expected to be maintained, which for the JIS 2017 & JIS 6061 test samples would have included the claimed $CuAl_2$ intermetallic, especially considering that all temperatures used by Tachikawa et al. are also employed & claimed by applicants. Alternatively, as it is old and well-known in the metallurgy art that $CuAl_2$ intermetallics provide strength to Al alloys, it would've been obvious to one of ordinary skill in the art to optimize their nitriding process, such that temperatures employed optimize the maintenance of desirable chemical microstructure in the alloy, which is consistent with Tachikawa et al.'s temperature teachings.

9. **Claims 4-5, 7 & 24-25** are rejected under 35 U.S.C. **103(a)** as being unpatentable over **Tachikawa et al.** (EP 0158271 A2), considering **Hirano et al**. (6,780,375 B2) & **Yakabe et al.** (2008/0169049 A1) as teaching references.

Tachikawa et al. do not discuss thermal conductivity values for their produced AlN layer, nor do they discuss the tensile fracture strength at the interface between the AlN & the aluminum alloy substrate, however they do essentially teach to optimize their temperature parameters, so as to avoid spalling of the aluminum nitride layer upon cooling, hence it would've been obvious to one of ordinary skill in the art that the process is intended to be optimized to have good adhesion, such that it would've been expected for the tensile fracture strength at the interface to be not less than that of the substrate material, thus complying with taught desire for the deposited layer not to spall (e.g. flake off), such that resultant tensile fracture strength values would have reasonably been within the claimed range. With respect to thermal conductivity, while no measured values are provided & PTO has no means to measure such values for products of Tachikawa et al., given like process steps & like materials, like thicknesses, like growth rates,

like hardness, it would have been reasonable for one of ordinary skill in the art to expect a thermal conductivity to be inherently the same, as there appear to be no critical differences in the processing steps which could produce significantly different thermal conductivity than the broad open ended claimed range.

With respect to voltage, or voltage & time parameters for the plasma nitriding step, while Takahashi et al. teach the option of using DC voltage for producing the glow discharge for the ion nitriding process, as illustrated in figure 1; and the claimed nitriding gases with teaching desirable pressures to be used in the process; they do not specify any particular voltage values or ranges, however it would've been obvious to one of ordinary skill in the art, that Takahashi et al(EP) reasonably expects one of ordinary skill to be able to determine useful voltages via routine experimentation that will produce their taught results, where such experimentation would have reasonably been expected to have yielded negative voltage values within the claimed range, since in order to ion bombard the substrate to cause taught ion nitriding, the metal substrate would have been expected to have a negative charge thereon, where the voltage of that applied negative charge would also have been limited due to the need to keep the nitriding temperature within the taught range, since the higher the voltage flowing through the metal substrate, the greater the heat produced therein, as is old and well-known by the competent practitioner in the art.

With respect to claimed voltages employed during the cleaning step, analogous routine experimentation would have been expected, with it additionally noted that while Tachikawa et al. only mentioned the possible use of inert gases, it would've been obvious to one of ordinary skill in the art that plasma gasses such as nitrogen, which themselves would not create contaminants in the chamber, would have been obvious to employ in combination or alternatively with the inert gas, with reasonable expectation of providing equivalent sputter cleaning effects, as well as flushing out contaminants in the chamber & removed from the substrate surface, thus providing effective preparation for the nitriding.

10. Alternatively, **Claims 4-5 & 7** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Tachikawa et al.** (EP 0158271 A2), considering **Hirano et al.** (6,780,375 B2) & **Yakabe et al.** (2008/0169049 A1) as teaching references as applied to claims 1-8 & 21-25 above, and further in view of **Tachikawa et al.** (4,909,862).

Tachikawa et al. (862) provides teachings that are said to be an improvement on prior art USPN 4,597,808 (as discussed in col. 1, lines 38-col. 2, line 6), which appears to be the equivalent of Tachikawa et al. (EP 0158271), thus the teachings in Tachikawa et al. (862) are clearly applicable to the teachings of the European patent primary reference.

Tachikawa et al. (862) provides teachings that the preparation stage, which cleans organic contaminants & aluminum oxide from the surface, can be accelerated by employing a chemically reactive gas, such as nitrogen gas in combination with inert gas (abstract; col. 2, lines 20-27 & 40-55; col. 3, lines 4-col. 4, lines 38, esp. lines 7; samples #1-5 in table 1 & #C2 & C3 in table 2; plus claims 1-7), thus substantiating the above obviousness with respect to N_2 gas, plus providing further motivation for its use it order to perform the plasma nitriding process more efficiently.

Furthermore, in Ex. 1, col. 5, lines 47-55, discussed the discharge process with respect to figure 1, indicating anode 12 (e.g. positive electrode) inside heater 10, with the substrate on holder 2 that is the cathode (e.g. negative electrode), where the DC voltage applied across the electrodes is several hundred volts, thus substantiating the above asserted negative DC voltage in the claimed ranges applied to the substrate, and further showing the obviousness of claimed parameters, as they would have reasonably been expected to have been applied in the exemplary processes of the primary reference.

11. **Other art** of interest includes: **Ohuchi et al.** (4,077,810) with teachings concerning Al alloys that contain Mg & Cu & intermetallic compounds thereof, that are finely precipitated in the matrix as age-hardening elements; **Lin et al.** ((5,248,384): col. 2, lines 25-68) has teachings concerning heating parameters under inert (nitrogen) atmosphere, employed to create Theta phase Al ($CuAl_2$) in Al alloy

having Cu content ranging from 0.5-4 %; **Hewitt-Bell et al**. ((6,376,375 B1): col. 5, lines 56-col. 6, line 43) have teachings concerning conditions under which $CuAl_2$ precipitation will occur; **Suzuki et al**. (4,522,660), with early teachings concerning ion plasma nitriding processes of Al or Al alloys; **Steinwandel et al**. (6,180,189 B1), with teachings of forming an AlN via high pressure plasmas using microwave radiation on Al basic alloys (e.g. Al_8Si-Cu; $AlSi_8Cu$, etc.), that it is desirable for its tribological properties & its comparatively high thermal conductivity for a ceramic material; & **Yamaguchi et al**. (JP 63-50456 A), whose English abstract indicates that Al or Al alloy material is treated in an evacuated chamber first with a halogen compound to activate the surface in RF glow discharge environment, then subsequently switched to a DC high-voltage source for glow discharge treatment in a nitrogen containing gas to create a hard, black AlN surface film.

12. **Any inquiry** concerning this communication or earlier communications from the examiner should be directed to **Marianne L. Padgett** whose telephone number is **(571) 272-1425**. The examiner can normally be reached on M-F from about 9:00 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks, can be reached at (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Marianne L. Padgett/
Primary Examiner, Art Unit 1792

MLP/dictation software 6/8-9/2009